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Train City Generator Description

This project focuses on generating a Minecraft settlement depending on the environment around it. The main aspect of this project is to create a whole city along with suburbs and an usable train network to allow the player to navigate around it.

This entry[1] for the GDMC competition is a fork from 2019 Eduardo Hauck entry[2] and will thereby assume the use of every feature that has already been implemented in this project, and will explain only what have been added.

New structures have been added, including **Farms**, **Towers**, **Bridges**, **Train network** and **Roller coasters**, as well as a **Fountain**.

For all theses structures as well as for the houses, the wooden materials are based on the surrounding trees. Considering all the trees in the settlement area, the more one tree type occurs, the more the structures has chances to be built out of this tree.

The **Fountain** is used as a landmark in the city center. It is composed with stone double slabs, with a center pillar, a first floor and a second floor, on which the water flows and follows the pattern of these floors. Lapis lazuli blocks are used in order to visually separate these different parts. A basin bordered with lapis lazuli blocks is then created on the floor where still water is placed. Lapis lazuli rings are also drawn on the floor for aesthetic purpose.

Farms are surrounded by wooden fences to separate them from the rest of the city. A grassy path starting from the entrance, a wooden fence gate, connects the structure to the roads. Inside the farm, cultures (carrots, potatoes...) are randomly generated following different patterns ; the main one being lines of water surrounding the farm plantations, or others like a "smiley farm" that is drawing a smiley face watchable from the sky.

Roller coasters are a system of rails looping to create a structure on a slope without modifying the terrain. It therefore follows a different pattern of construction compared to the other structures.

[1] https://github.com/Karaokruk/TrainCity
[2] https://github.com/ehauckdo/UrbanSettlementGenerator

The algorithm consists of finding, from one of the highest points of the lot, the longest path that fulfils the Minecraft rails requirements (a rail that goes down cannot turn...), going down and staying at the same level for a maximum length of 5 blocks (to avoid snake-shape rails especially at the end of the path).
It therefore tries to connect the starting point to the ending point going on another way than the initial one so that the whole system loops.
Every "going-down" rail is a rail powered by a redstone torch 2 blocks beneath it ; while all the others are regular rails. Beneath each rail is placed a wood log, and a chest is placed close to the starting point.
In case the algorithm fails to find a path that fulfils all these requirements, or if the chosen path is too short, a **Tower** is generated instead.

Tower, along with the **Roller Coaster**, is a type of structure that does not require to flatten the lot before the construction. It is a building relatively narrow but high so that it can be built on very steep terrain. The tower is made out of bricks ; inside are findable a chest and furnace at the bottom, and a wooden staircase that goes to the top of the tower, where there are windows, and a little platform with a crafting table and an anvil.

The train network is a special structure that is generated in the settlement all around the center part.
It consists of a stone path raised in the air on which rails are placed for the player to travel through the settlement at a faster paste. Powered rails are placed every time the rails goes up, and a redstone block is placed beneath it. A stone pillar that goes from the ground to the path is placed every 10 blocks on the way. Fences are placed on every side of the rails, and torches are also placed on it every 10 blocks.
Stations are then generated along the path (2 stations for a small settlements, 4 either) and above a pillar on which ladders are added in order for the player to go inside, and are then linked to the settlement roads.

Bridges are another special structure allowing the path-finding algorithm to go above the water, and therefore generates a bridge across it.
A bridge is made out of slabs, which means it can gain half a block of height for every block of length, so depending on the height of the extremities and the length of the bridge, it can be built differently. Depending on this, the bridge can be built in the shape of an arch or a slope.
Regular bridges are made out of stone, but on grassy path (path leading to farms), the bridges are made out of wood.

Along the path, lamps are also added in order to lighten the settlement. Lamps are made out of cobblestone walls, redstone lamps and daylight detectors.

Concerning the trees scattered around the settlement area, all are erased, and only the ones not hindering any structure are planted back.

The generation of the settlement can be customized from the MCedit interface, by choosing the type of settlement (city, village...), the generation or not of **Train network**, as well as the material used to build the **Train network**

(*Urban* for stone, *Country* for wood).